

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,667	08/31/2001	Shuichi Kikuchi	10417-094001	1120
26211	7590	10/15/2003	EXAMINER	
FISH & RICHARDSON P.C. 45 ROCKEFELLER PLAZA, SUITE 2800 NEW YORK, NY 10111			THOMAS, TONIAE M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 10/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/943,667

Applicant(s)

KIKUCHI ET AL.

Examiner

Toniae M. Thomas

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 10 September 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10 September 2003 has been entered.
2. Currently, claims 1-3 and 8-14 are pending.

Claim Objections

3. Claims 12 and 13 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 2 and 3. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2822

4. *Claims 10, 11, 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

The phrase "third drain region" lacks antecedent basis (claims 10, 11, and 12, every occurrence).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. *Claims 1, 8-11, and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Tung (US 6,117,738).*

Regarding claims 1, 8-11, and 14

Tung discloses a semiconductor device (figs. 2A-2E and col. 3, lines 15 - col. 4, lines 22). The device comprises the following elements: a gate electrode 216 formed on a first conductive type semiconductor substrate 200 through a gate oxide film 214 (fig. 2D); a first low concentration drain region 206 of a second conductive type, provided at one end of the gate electrode (fig. 2D); a second low concentration drain region 210 of

Art Unit: 2822

the second conductive type, provided in the first low concentration drain region (fig. 2D), the second low concentration drain region 210 being disposed close to an outer boundary of the first low concentration drain region 206 and being higher in impurity concentration than at least an impurity concentration of the first low concentration drain region (col. 4, lines 4-7), wherein at least part of the second low concentration drain region is extended to an area under the gate electrode (2D); a high concentration source region 218 of the second conductive type provided at another end of the gate electrode (fig. 2D); and a high concentration drain region 220 of the second conductive type formed in the second low concentration drain region, the high concentration drain region being spaced away a predetermined distance from the gate electrode and being higher in impurity concentration than the second low concentration drain region, as recited in claim 1 (fig. 2E and col. 4, lines 4-7).

Relatively, the first and second low concentration drain regions, 206 and 210, respectively, have low impurity concentrations, and the high concentration drain region 220 has a high impurity concentration, as recited in claim 8 (fig. 2E and col. 4, lines 4-7).

The second drain region 210 has a higher impurity concentration than the first drain region 206, and the third drain region 220 has a higher impurity concentration than the second drain region 210, as recited in claim 10 (col. 4, lines 4-7).

The first, second, and third drain regions 206, 210, and 220, respectively, and the source region 218 are of a second conductivity type, N-type, and the semiconductor substrate 200 is of a first conductivity type, P-type, as recited in claim 11 (fig. 2E).

Art Unit: 2822

The first, second and third drain regions 206, 210, and 220, respectively, form a triple well structure in the semiconductor substrate such that the third drain region 220 is the innermost well, the second drain region 210 is the middle well surrounding the third drain region, and the first drain region 206 is the outermost well surrounding the second drain region, as recited in claim 14 (fig. 2E).

Regarding claim 9

Tung discloses a semiconductor device, the device comprising: a semiconductor substrate 200 (fig. 2A); a gate oxide film 202 provided on the semiconductor substrate (fig. 2A); a gate electrode 216 disposed on the gate oxide film (fig. 2D); a first drain region 206 provided at one end of the gate electrode in the semiconductor substrate (fig. 2D); a second drain region 210 provided in the first drain region 206, an outer boundary of the second drain region being disposed close to an outer boundary of the first drain region, wherein at least part of the second drain region is extended to an area under the gate electrode (fig. 2D); a third drain region 220 provided in the second drain region 210, the third drain region being spaced away a predetermined distance from the gate electrode and being spaced apart from the outer boundary of the second drain region (fig. 2E); and a region 218 of the second conductive type provided at another end of the gate electrode (fig. 2E), wherein the first, second, and third drain regions all having different impurity concentrations (col. 4, lines 4-7), as recited in claim 9.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. *Claims 2, 3, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tung in view of Wolf (Silicon Processing for the VLSI Era – Vol. 3: The Submicron MOSFET).*¹

Tung lacks anticipation only in not teaching: that the first low concentration drain region 206 and the second low concentration drain region 210 are formed by utilizing two kinds of second conductive type impurities, wherein the two kinds of the second type conductive impurities have different diffusion coefficients, as recited in claims 2 and 12; and that the first drain region and the second drain region are formed using phosphorus and arsenic ions, respectively, as recited in claims 3 and 13.

Wolf discloses a double diffused drain (DDD) structure for an NMOS field effect transistor (pages 588-590). The DDD structure comprises a first drain region n^- and a second drain region n^+ , wherein the first drain region has a lower concentration than the second drain region (fig. 9-26). The first drain region and the second drain region are formed using two kinds of N-type impurities, phosphorus and arsenic, which have different diffusion coefficients (page 588, third paragraph). The first drain region n^- is

¹ The Wolf reference was relied upon in the previous Office action mailed on 08 April 2003.

Art Unit: 2822

formed using phosphorus ions, and the second drain region is formed using arsenic ions.

The DDD structure in Wolf is formed by co-implanting phosphorus and arsenic ions into the same region using two separate implants, and performing a high temperature anneal. The anneal causes the phosphorus and arsenic ions to diffuse simultaneously resulting in the DDD structure. Because phosphorus diffuses faster than arsenic, the phosphorus ions are driven farther than the arsenic ions. This creates a less abrupt concentration gradient for the drain region (page 588, third paragraph).

Since both Tung and Wolf disclose an NMOS transistor comprising a drain region, wherein the drain region has a concentration gradient, the purpose disclosed by Wolf would have been recognized in Tung by one of ordinary skill in the art at the time the inventions was made.

One having ordinary skill in the art would have been motivated to modify the NMOS transistor of Tung, at the time the invention was made, such that the first and second drain regions are formed by utilizing two kinds of second conductive type impurities, the two kinds of the second type conductive impurities having different diffusion coefficients, and such that the first drain region and the second drain region are formed using phosphorus and arsenic ions, respectively, since phosphorus diffuses faster than arsenic and, thereby creates a less abrupt concentration gradient for the drain region.

Response to Arguments

7. Applicant's arguments with respect to claims 1 and 9 have been considered but are moot in view of the new ground(s) of rejection.

8. The amendment filed on 10 September 2003 has overcome the following objection(s) and/or rejection(s) made of record in the Office action mailed on 08 April 2003: the objection to the abstract of the disclosure, and the rejection of claims 8 and 9 under 35 USC §112, second paragraph.

9. New corrected drawings are required in this application because the examiner has approved the proposed drawing correction filed on 10 September 2003. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toniae M. Thomas whose telephone number is (703) 305-7646. The examiner can normally be reached on Monday through Thursday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (703) 308-4905. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Application/Control Number: 09/943,667

Page 9

Art Unit: 2822

JMJ

29 September 2003



AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800